# The CHEMIST

FEBRUARY, 1939 VOLUME XVI, NO. 2

THE YOUNG CHEMIST AND THE GOVERNMENT SERVICE

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THE LABORATORY—A POTENT SOURCE OF PROGRESS IN INDUSTRY

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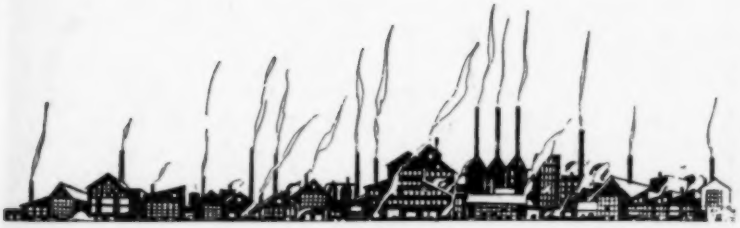
THE CHEMIST ADVISORY COUNCIL



# *The* CHEMIST

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## TABLE OF CONTENTS



THE AMERICAN INSTITUTE OF CHEMISTS
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# The Charm of the Institute

*by* **Robert J. Moore**

***President,* The American Institute of Chemists**

THE center emblem of THE AMERICAN INSTITUTE OF CHEMISTS is taken from the alchemist's symbol meaning "the essential thing", surrounded by a double circle symbolizing "all embracing". To the alchemist "the essential thing" or essence was the life-giving quality—the moving spirit.

What then does this emblem represent in the mature chemical life of our times? Charms in an older day were worn as amulets to avert catastrophe or illness; as talismans of hope and good fortune. And well may we consider the INSTITUTE's charm as an amulet symbolizing a determination to avert any catastrophe, any harm, to the chemist and his profession.

For it is well for the chemist to realize that dangers lurk ahead, dangers which threaten the integrity of his profession and which even now are sapping at his strength through trade unionism and labor legislation. We all are aware of the rapid spread of labor unionization through the A. F. of L. and the C. I. O. But many of us will be surprised and perhaps skeptical to hear that recently chemists have been barred by labor from going beyond their laboratories in manufacturing plants. Chemists have been unable to conduct plant test runs on threat of strike unless every chemist was also in a union! The organized labor in these plants accepted the right of professional engineers, when state licensed, to come

and go as they pleased but, like the average lay mind, they did not recognize the chemist as a professional man. And, of course, in this they are aided by the absence of laws recognizing the profession and licensing it.

The American chemist has too long neglected his profession in his zeal for his science. He has given his full attention to chemical and physical actions which nature controls, and has left untouched the reactions both professional and political which he himself should control. He has built the greatest Chemical Society on earth and with unsurpassed advancement to the science of chemistry and its publications, but he has fallen far behind his brethren in the medical, legal, and engineering worlds in his contacts with life about him. How frequently do we hear that veiled criticism, "He is too good a chemist to be a good business executive." He has, because of his scientific zeal, given to many the impression that the chemist *per se* is an introvert and unfitted, therefore, to meet the open field, half way to extroverts, who stand forthright with a bold front for defense or attack.

Into this breach, THE AMERICAN INSTITUTE OF CHEMISTS, organized in 1923 on a professional basis, now stands forth for the recognition and the protection of that profession. With rigid requirements for membership, girded with high standards and a code of ethics, it proclaims the need for legal status and state licensing. It is proceeding with legislation in New York and Pennsylvania, and is taking initial steps in Illinois. Through this method alone can it meet the threat of encroaching activities of other professions, such as the medical men in clinical and public health laboratories, on one hand, and the labor union activities on the other. It is through state legislation alone that we can legally define the chemist and his profession. It is hoped that before the year passes the licensed professional chemist will be recognized along with his licensed professional brethren the engineer, the lawyer, and the medical man.

The Charm of the INSTITUTE signifies this group of chemists, able in the practice of their profession, who are alert to any influence which would inhibit its growth or curtail its activities. It symbolizes an INSTITUTE which realizes that its own integrity, as well as human relations, requires that a helping hand and efficient counsel be extended to those chemists temporarily unemployed. This it does through the Chemist Advisory Council.

The chemist is proud of his profession. He should with equal dignity wear its emblem—the Charm of the INSTITUTE.

# The Laboratory—A Potent Source of Progress in Industry

*By* **Dr. Frank B. Jewett**

***Vice-President*, American Telephone and Telegraph Company; *President*, Bell Telephone Laboratories, Inc., New York**

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THE industrial research laboratory as we have it today is relatively a very new addition to the machinery of applied science industry. Although superficially it may appear to be the modern edition of the experimental departments or laboratories of the 1880's and 1890's, it is basically quite different and infinitely more potent in influencing the progress of industry.

The first embryonic industrial research laboratories appeared shortly after 1900 in the fields of applied electricity and chemistry—both products of fundamental science research and both relatively new areas of industrial exploitation. This was absolutely true as to applied electricity in which the major part of all commercial development had taken place subsequent to 1875. Applied chemistry, although a much more ancient art, had been vastly stimulated by the fundamental science discoveries of the latter decades of the nineteenth century.

In both these fields, it was apparent by 1900 that fundamental science knowledge had outstripped industry's ability to utilize it by application of the methods then in use. It was clear, also, that the gap was widening. A few men sensed that, if the situation was to be rectified, and industry insured of full and prompt application of new knowledge, three things were necessary—(1) trained research men, (2) the introduction into industry of the philosophy and techniques of the scientific method which had proven its power in fundamental science, and (3) organization of the new group and its methods as a team and as an integral part of industry.

At first progress was slow. There were few trained men who were interested in and available for industry; proper experimental tools suitable for industrial problems were few and in many cases non-existent; management was skeptical of the value of the new "expense" department as it was frequently termed, and the older "practical" men were in many cases frankly antagonistic. In addition, there were no guides as

to how best to coördinate the new activity with the existing organization.

Gradually, however, and with ever-increasing acceleration progress was made. Problems, which were clearly beyond the capacity of the existing organization, were solved and confidence and respect developed; tools were created; universities began to attract and train men for a life in industrial rather than fundamental science; the team was organized and began to pour out on industry applications of new knowledge, the utility—in many cases even the existence—of which was unsuspected by management, and the value of organized industrial research as an instrument of progress was certified to by the spread of the idea into more and more fields.

The period of the World War and the two decades since have witnessed an astounding growth both in the number, size, and functionalization of industrial research laboratories. There is now little or no question raised as to their value. Through it all the fields of their origin are still largely the fields in which they have attained their largest size, their most complete functionalization, and their greatest efficiency. As one surveys the fields of industry based on applied science, he can not but be struck by the fact that those which have made the most progress and are in the strongest position are those in which the research laboratory is well developed, and its function and value well understood and supported. Nor can he fail to be struck by the fact that many industries, once healthy and powerful, but now in a distressed condition, are those in which the research laboratory is either poorly developed or non-existent and the management lacking in a real understanding of its functions and possibilities.

Volumes have been written about the achievements of the industrial laboratory. Most of it is true, in the main, although some of it has been dressed up in gaudy clothes by the publicity man much to the annoyance of his research associate. Whatever the basis, there are probably few who do not admit that the laboratory does produce astounding results—many go further and credit it with ability to do the impossible.

While all of this is now taken more or less for granted, there is one aspect of industrial research which, it seems to me, has thus far failed to receive the attention it deserves. I refer to appraisal of the research laboratory and to the attitude of the management toward this function of their business by those called upon to examine and advise concerning the stability of an undertaking prior to the investment of funds. Were I called upon to form such a judgment of an applied science undertaking, these points would be the first I would inquire about. If I found the

attitude of management indifferent or essentially uninformed and the research function poorly organized, I would consider the business unstable no matter what the current financial statement might show.

To me such a condition would evidence danger both from competitors in the same field of activity and more danger from entirely unsuspected competition of new alternative goods or services from outside. If, on the contrary, the research function was well organized and supported and the attitude of management was based on really informed understanding, I would consider that the business was insuring against future contingencies and was in a strong position to maintain leadership and to survive.

Possibly a life spent mainly on the research and development side of a highly technical applied science industry has caused me to accord an undue weight to these factors among the many that must be considered by those contemplating the safe investment of funds. Whether this is so or not, clear understanding of what organized industrial research is capable of doing for the business of which it is a part cannot but convince one that it is a very potent factor in determining the success of the undertaking.

Primarily and principally, the research laboratory produces new and improved things in a specialized field. It takes the established facts of fundamental science research and, using exactly the same powerful tools by which these facts were obtained, it manipulates them to produce old things better and cheaper or entirely new things of interest to the industry. These alone would justify the maintenance of the laboratory, since they are the things which guarantee leadership.

But the research laboratory does much more than this. In so far as its achievements are subject matter for patent protection, it provides management with a currency which is more potent than gold in insuring complete freedom of action and in some cases even the right to live. Modern applied science industry is so complex, involves so many things of science, and is developing rapidly in so many directions, that no single unit, however large and however well equipped its research department, can hope to produce *all* the new ideas which are essential to its well-being. When one of these necessary ideas is developed and patented on the outside, a license to use must be purchased. If the idea is in the hands of a competitor, money alone may be of no avail with an unwilling seller. Where, however, the prospective purchaser is possessed of an

adequate research department, it can, more frequently than not, provide a currency in kind which can be used in a bartering operation of cross-licenses. In many cases this barter currency or wampum is already at hand, produced in the primary operation of the laboratory and so the new thing is purchased without addition to the capital or operating accounts.

With the growth in number, size, and efficiency of industrial research laboratories, their potentialities for producing new things embarrassing to competitors has become increasingly evident. The result is a growing tendency in cross-licensing to provide automatically and in advance for an interchange of rights throughout the duration of the contract.

A principal reason for this necessity is because the power of organized research is primarily the power of trained minds employing a powerful method and manipulating a vast store of established facts. Thus the organization can turn its weapons of creation in any one of many directions and overnight almost become as skillful as a similar group long established in the field.

In another direction also the research laboratory is a powerful aid to management, particularly when a large part of its activities are directed toward a somewhat distant future. Such activities mark out accurately the future path of industrial progress and so enable management to make plans with a much higher degree of certainty than would be possible otherwise. Likewise, they place it in position to judge quickly and accurately the value of a new idea or trend injected from the outside and for which substantial values are claimed by its proponents.

The larger the proportion of the laboratory's work that is devoted to the problems which deal with the fundamental, rather than the current, interests of the industry the more valuable in general are the results. This is true both as to the new things it produces and in its aid to management in meeting competition and in planning for the future.

The great modern applied science industry is a complex affair in which the coöperative functioning of many departments frequently masks the fundamental factors on which the success or failure of the business ultimately depends. In the last analysis, these are physical things and it is safe to say that no amount of ability in the financial or commercial departments can more than temporarily offset inherent deficiencies in the physical things in which the business is grounded. When these are allowed to become obsolete, the operating departments and the business begin to decline. It is the function of the research laboratory to prevent this obsolescence.

The power of the industrial research laboratory resides in the philosophy of controlled experimentation and in organized coördinated attack by trained specialists on each element of a problem. It differs from the fundamental science research laboratory only in that the work of the latter is but loosely coördinated and that it has a definite utilitarian objective for its work rather than a mere seeking after new knowledge for its own sake. In it every problem to be attacked is first analyzed and dissected into its component parts, each one of which becomes the problem of a specialist or group of specialists. When their work is completed, the parts are synthesized into a complete solution.

The process is one which, when properly carried out, practically precludes the possibility of a major technical failure in the act of commercialization. The reason for this is that the final solution is one arrived at by the discovery and correction of a large number of minor defects or errors of assumption. As a result the chance of a major defect remaining in the final answer is practically non-existent.

Many of the great applied science industries which are of major importance to us at present had their origins in the laboratory and owe their present state and their future prospects to industrial research. To name but a few, this is true of applied electricity whether in the fields of light and power or of communication; of organic and inorganic chemistry; of sound and light as they appear in talking motion pictures; in many forms of metallurgy; of everything pertaining to aeronautics; to the internal combustion engine; and to a host of other things. In every field each step forward is making us more dependent on the laboratory and is taking the laboratory deeper into the realm of fundamental science.

While innumerable illustrative examples to show all this can be selected from any field of applied science, it may be interesting in conclusion to cite a few from the field of electrical communication, which is the one with which I am most intimately familiar. Mainly, they are the work of the Bell Telephone Laboratories, the research department of the Bell System.

Possibly the most striking thing about telephone service in the United States and the one most commented on and inquired about is the completing of an asked-for connection to a distant telephone anywhere on the continent in a few seconds, while the calling subscriber remains at the telephone. It is a thing which could not have been done a few years ago and which practically cannot be done now anywhere else in the world.

That it is possible is because the research men have solved the problems of creating adequate transmission circuits from every central office to every other central office at such low cost that they can be provided in sufficient profusion to guarantee against "circuit busy" conditions in the vast majority of cases even at times of peak demand. They have done this by applying much new knowledge in many new ways. They have developed powerful energy-amplifying devices which have made it possible to give better transmission over fine copper wires than could be given a few years ago over wire many times larger and so many times more costly. Even this, however, was not sufficient to permit vaulting the economic hurdle on many of the routes. Since mechanical stability and integrity place a limit to reduction in wire size long before the electrical limit is reached, this hurdle could only be jumped by making each circuit carry many conversations at the same time.

Present success in this direction may be judged by the fact that for certain classes of long-distance circuits, systems are now standard in which sixteen separate telephone conversations are transmitted simultaneously over the same facilities which a few years ago were capable of handling but a single conversation. Experimentally, we also have in operation systems which will transmit many hundred messages over a single channel.

While these statements are not to be construed as meaning that the added facilities are obtained without cost, they are obtained at a fraction of the cost that would be entailed in providing them otherwise —a cost so high as to be economically prohibitive.

Still having in mind the problem of "no delay" service and its dependence on a profusion of circuits on every route of a vast network, let us turn now to an entirely different area in which the laboratory has had to operate in order to make the service possible.

Between the big cities, with their large volume of social and business intercourse involving telephony, the problem is relatively simple once the transmission problem is solved. Here the amount of traffic is sufficient to justify groups of direct trunk circuits used exclusively for terminating business, and inter-city business over them is handled somewhat like business between two central offices in the same city. It would, however, be most unsatisfactory to the public to have one grade of expeditious service between big cities and an entirely different and inferior service everywhere else. Just what is involved in

assuring to a subscriber in Eastport, Maine, wishing to talk to San Juan Capistrano, California or to one in Red Wing, Minnesota, wishing to talk to Biloxi, that each will receive substantially the same kind of service he would obtain on a call from New York to San Francisco?

Obviously, no matter how cheap the transmission channels might be—even if they cost nothing—it would be impossible to provide direct circuits between every pair of central offices. One call in a lifetime, if any, would be the measure of usage over most of the circuits and yet the telephone company must be prepared to give that call instantaneously on demand, if it is made.

What the telephone company can and does provide are sufficient circuits from all offices, however small, to their nearest toll centers, and of proper transmission characteristics to handle all the local and long-distance service that may be offered. What the research laboratory has to cope with, therefore, is the problem of creating mechanism for connecting circuits together instantaneously on demand and, in addition, to make it so cheap and reliable and so adequate from a supervisory standpoint that it too can be installed in profusion without killing cost or without unnecessary drag on the use of circuits. On many of the odd connections that are asked for, a half dozen or more switches are required and yet the connections are established while the calling party remains at the telephone and the resulting circuit between the distant telephones is a good speech channel.

This problem is so vast and intricate that it could not possibly be solved except through the mechanism of thoroughly organized industrial research. Its ramifications have led us into practically every nook and cranny of fundamental physical science and to the development of inanimate devices which have truly human intelligence.

The story of transoceanic radio telephony by which the great wire networks of separated continents are connected together; of radio broadcasting; of communication to ships and aeroplanes; of modern message telegraphy and phototelegraphy and their operation simultaneously with telephony, and a host of other adventures in electrical communication all present much the same picture of a powerful method in operation.

Nor is the end of the road in sight, since each step forward makes possible many other steps in the same direction, if we have but the desire, will, and intelligence to take them. In this field what men of

imagination fifty years ago envisioned largely as an act of faith, viz., a world-wide telephone system so complete, adequate, and cheap as to offer no substantial bar to full and free intercourse, now seems positively and certainly attainable.

As mentioned earlier, similar stories can be told of every field where organized industrial research has been introduced into applied science. In conclusion, all I would say is that the research laboratory, if not the most potent source of progress in industry, is certainly one of the most potent. If proof of this is still wanting, just picture to yourselves what would happen to applied science industries if the contributions of the laboratory during the past two decades were to be suddenly withdrawn. Many of them would vanish and all would shrivel to crude affairs measured by present-day standards. Untold thousands of those now gainfully employed would be added to those without work and the public would be deprived of goods and services which we have come to consider necessities rather than novelties or luxuries.

# The Young Chemist and the Government Service

*By* **Louis Marshall**

**The second of a series of articles on the opportunities for Chemists in the Government service.**

## Government Specifications and Commercial Standards

ONE WOULD not be justified in omitting mention, even in a brief description of the Bureau of Standards, of its work on Federal specifications and commercial standards. The government purchases nearly all of its supplies on specification. A specification defines more or less closely the composition and properties which a particular item must have in order to make it acceptable for purchase by the Government.

The work of drawing up a specification for a particular product requires the services of a committee of experts who understand the technology, the properties and the services which the product is intended to perform. The opinions of manufacturers, distributors, and users of the product are taken into consideration. Then, when all relevant information regarding the product is obtained, the specification is drawn up by the Federal Specifications Executive Committee. It is then

submitted for approval by an official who is known as the Director of Procurement. When it is finally approved, all the Government departments stipulate in their contracts for the purchase of this product that it must comply with the Federal specification covering it. The painstaking work that is expended in the drawing up of a specification is due to the realization that a poor or improper specification can be worse than useless; detrimental to the buyer and oppressive to the scrupulous manufacturer. This straightforward and rigorous method of Governmental purchasing tends to reduce the uncertain elements to a minimum and assures the procurement of commodities which are satisfactory because they have passed the required tests. Thus, the glib tongue of salesmanship finds no place in purchases under Federal specification. High-priced masters of ceremony and entertaining radio programs play no part in the transaction. The Director of the Bureau of Standards serves as chairman of the Federal Specifications Executive Committee under whose auspices more than one thousand specifications were prepared. They cover such diverse items as welding rods and mincemeat; writing ink and surgeon's gloves. What an enormous amount of investigation and testing was necessary before this work was accomplished!

Industry has not been slow to grasp the advantages of this method of buying. Many trade associations have appealed to the Bureau for assistance in standardizing certain products. This work became so important that the Bureau, in 1927, established a unit dealing with commercial standardization. By 1929, the value and importance of this unit were so evident, and the demands which industry placed upon it so great, that the unit was enlarged and made a division now known as the "Division of Trade Standards".

The purpose of the division is to assist the various industries in establishing standards for their products below or beyond which their grade or quality must not fall. Encouragement is thus given to industry to produce commodities which are acceptable and which may be purchased by the consumer with the full confidence that they will perform well in their intended functions. "A commercial standard can, therefore, be defined as a specification for a particular product, which specification has been voluntarily formulated and accepted by the industry concerned, as a basis for its daily trade. The task of drawing up an acceptable commercial standard is fraught with difficulties and complications, but the work is proceeding constantly.

The steps involved in the establishment of a standard are as follows: A trade association or an individual company, in writing, requests the

coöperation of the Bureau of Standards. The latter assigns the task to one of its experts who represents the Bureau officially in its contacts with the industry. He calls preliminary conferences of the producers and other interested persons to gather all relevant information upon which a tentative specification can be built. If the data obtained in this manner is too meagre to be of much value, it is then necessary to conduct original investigations and laboratory tests in order to collect more information. The next step is to draw up a tentative specification which holds promise of a favorable reception by all interested parties. Following this, the Bureau calls a general conference of all known manufacturers, distributors, and organized consumers. Frank criticisms of the tentative specification are invited at this meeting. Modifications and amendments to it may be made. The conference then votes on whether or not to accept the specification as a "recommended commercial standard". If it is accepted, the Bureau sends copies of it to all manufacturers, distributors, and organized consumers with the request that they formally agree to accept it in writing. When signed acceptances are received from firms representing at least sixty-five per cent of production or consumption, and if no active opposition is apparent, the commercial standard is officially promulgated. Copies of it are printed by the Public Printer and sent to all interested parties for a very nominal price, usually five or ten cents. In the meantime, a standing committee is appointed to keep abreast of new developments which may arise, and to recommend modifications of the commercial standard when deemed necessary. The Bureau finally obtains a list of firms who have expressed willingness to certify to purchasers that their products comply with the requirements of the commercial standard. These lists are available to anyone, and by this means, the individual consumer, as well as the large corporation, has the advantage of buying products certified as to their quality. The entire process leading toward the establishment of a commercial standard takes about one year, though this time varies considerably depending upon the particular item under consideration.

In the comparatively few years of its existence, the Division of Trade Standards has established commercial standards for about eighty diverse items including, for example, a highly satisfactory dry cleaning solvent known as stoddard solvent, articles of clothing like boys' blouses and woven dress fabrics, and of particular interest to chemists, a commercial standard for interchangeable ground glass joints, stopcocks, and stoppers.

The National Bureau of Standards, by virtue of its activities, has long

since become a vital and respected force in the scientific and commercial life of our nation. It has happily blended scientific research with commercial utilization. Its achievements are long and impressive. The optical glass industry in the United States owes much to the Bureau for solving the difficult technique required in its manufacture. The production of rare sugars, used in research work in pathology, was accomplished by research workers at the Bureau. These sugars were formerly obtainable only from abroad. The discovery that a thin coating of pure aluminum greatly decreases the atmospheric corrosion of duralumin can be credited to the Bureau. Duralumin, which is an alloy of aluminum with small proportions of copper, manganese, and magnesium, is largely used in aircraft construction and this simple method of reducing corrosion has been widely applied. The Bureau is responsible for the establishment of the corn sugar industry; for a successful process of plating steel and other metals with chromium; for developing the fine paper used in printing United States currency; for eliminating unnecessary varieties of sizes and styles of articles in common use; and for establishing standards by means of which commodities can be safely bought.

The Annual Report of the Secretary of Commerce for the year 1937 sums up the value of the fundamental investigations conducted at the Bureau with the following words: "Research that provides the foundation for the building of new industries is the best form of insurance against economic instability."

In an effort to broaden the facilities of laboratories devoted to fundamental investigations in the physical and chemical sciences, a bill was placed before the House of Representatives on February 25, 1938. Known as H. R. 9632, it provides funds for the conduct of these researches not only by the Bureau of Standards, but also by the laboratories of colleges, universities, and other non-profit research agencies; these latter working under the supervision of the Bureau. The purpose of the Act is to "further the development of industry and commerce by providing a broader foundation of scientific facts and discoveries upon which new advances in industry and commerce may be based". This proposed legislation has received the endorsement of such men as the director of the Bureau of Standards, Lyman J. Briggs; the president of the Massachusetts Institute of Technology, Karl F. Compton; and the secretary of the American Chemical Society, Charles L. Parsons. The bill was not acted upon by Congress during the session in which it was introduced, but its adoption may be expected in the future. As the

sponsors of this legislation have demonstrated, research in the fundamentals of science is a venture through which the nation always stands to gain. The passage of this bill should provide active fields of work for scientists, and since the researches which it contemplates may prove of incalculable benefit to the nation, it is to their enlightened self interest to urge its enactment.

**Publications**

An insight into the wide range of subject matter engaging the attentions of the Bureau of Standards is afforded by a study of its publications. These are listed in ten separate series as follows: Series S which refers to the Scientific Papers; series T referring to the Technologic Papers; C, Circulars; H, Handbooks; R, Simplified Practice Recommendations; C. S., Commercial Standards; L, Limitation of Variety Recommendations; B H, Building and Housing; M, Miscellaneous Publications; and series J which refers to the regular monthly publication known as the *Journal of Research* of the National Bureau of Standards. This noteworthy journal made its first appearance in 1928, and since that time it has included the publications formerly appearing as Scientific Papers and Technologic Papers. The separate publications in each series are numbered consecutively. For example, S 533 is the five-hundred and thirty-third publication of the Scientific Paper Series. It is a very advanced discussion on the relations between rotatory power and structure in the sugar group. T 136, or Technologic Paper 136, deals with the determination of free carbon in rubber goods. C 315 is a United States Government master specification for caustic soda (lye) for cleaning purposes. H 12 is a code for the protection of buildings against lightning; and so on. All of these publications have been systematically compiled and indexed. Circular 24 contains a list of the publications of the Bureau from 1901 to 1925. Then there is a supplementary list covering the years 1925 to 1930, and lists covering the publications since 1930 have been issued. These indexes are a very valuable source of information regarding the scientific work of the Bureau not only in chemistry, but in physics, engineering, and other fields as well. Any of the publications listed in these indexes, except those which are out of print, may be obtained from the Superintendent of Documents, Washington, D. C., at the nominal prices indicated.

**Personnel**

The Bureau employes a total of one hundred and twelve chemists. They are distributed among the grades as follows: one head chemist;

seven principal chemists; eleven senior chemists; thirteen chemists; twelve associate chemists; thirty-one assistant chemists; and thirty-seven junior chemists.

There are also many employees at the Bureau who do work of a subordinate nature, and who hold ratings in the various grades of the subprofessional service.

### The Bureau of Fisheries

The Bureau of Fisheries is another subdivision of the Department of Commerce which employs chemists. Work is done in the field of food research as applied to the preservation, marketing, and uses of fish and fish products which are the country's primary source of vitamin D. As part of the conservation efforts of the Bureau, investigations are conducted to find new uses for the waste products of the fishery industries. Waste flesh, for example, has been converted into animal foodstuff. Other waste portions of the fish have been converted into fish oils and fertilizer meals. Chemists and bacteriologists coöperate in this task of building a truly scientific fishery industry in the United States. The Bureau maintains about sixty hatcheries for the purpose of restocking streams and lakes which, for various reasons, have become depleted or exhausted. At these hatcheries, studies are carried out with a view to improving the strains of different species of fish by means of selective breeding, suitable diets, and other methods. The young fish that are released into the streams and lakes of our nation are thereby given the best chance to grow to maturity. Fishery laboratories are maintained at Washington, D. C.; College Park, Indiana; Gloucester, Massachusetts, and Seattle, Washington. The staff of scientists employed by the Bureau includes two chemists, both in the Junior classification.

### The Bureau of Lighthouses

The Bureau of Lighthouses of the Department of Commerce has two assistant chemists in its laboratory at Staten Island, New York, to do analytical work on products used in the service. These include petroleum, coal, rubber, clay products, abrasives, iron and steel, and miscellaneous chemical materials.

### United States Bureau of Mines

The Department of the Interior has under its wing the United States Bureau of Mines which is a scientific organization devoted to research in the mining, metallurgical, and petroleum industries. The Bureau was established by Act of Congress in 1910. The reason for its establishment was the desire, on the part of the Government, to eliminate the

serious hazards in the mining of bituminous coal. A series of calamitous explosions in the coal mines of the nation aroused public opinion to demand safer methods of mining. The Bureau of Mines was commissioned by the Government to discover them.

This work still forms the important part of the activities of the Bureau. Its early publications are largely concerned with the mine safety problem. Bulletin 10 of the Bureau deals with the use of permissible explosives. Bulletin 15 reports the results of investigations on explosives used in coal mines. Bulletin 17 is a primer on explosives for coal miners. It discusses their composition, explosion and combustion; methods of handling squibbs, fuses, detonators, and explosives, and instructs regarding the best methods for their shipment and storage. The Bureau maintains a Safety Division whose function it is to give safety courses to employees in the mining and allied industries. Safety instructors, specially trained for the purpose, go from place to place, giving instructions in first aid, mine rescue, and accident prevention. This effective means of arousing safety consciousness in the mine workers probably saves about two hundred lives each year, and prevents about twenty-five thousand lost-time, non-fatal accidents. Employees who complete the first-aid course, accident-prevention course, or mine-rescue course receive certificates which are esteemed by the mine workers as a symbol of proficiency. In one year, the Safety Division trained more than seventy-seven thousand persons in methods of first aid. The Division thus puts to practical application the results of the researches of the Bureau regarding safe practices in the mining, metallurgical, and petroleum industries.

The publications of the Safety Division deal with such topics as first-aid training, mine gases and their sampling and analysis, methods of reducing industrial accidents, safety rules for mine workers, safety organization work, permissible explosives, and so on. These efforts toward accident prevention have not been in vain. Mining today is far more scientific, far safer, and far more economical than in the days before the establishment of the United States Bureau of Mines.

The activities of the Bureau were gradually enlarged to include not only investigations of problems in the coal mining industry, but also researches into all the mineral and petroleum resources of our nation. At the present time, the Bureau is divided into four branches: the Technologic, Economic, Health and Safety, and Administrative. The laboratory work is done by the Technologic branch which contro's the Experiment Stations. The work is divided into the following divisions, each

of which conducts researches on the products indicated by its title: Coal, Mining, Metallurgical, Petroleum and Natural Gas, Explosives, and Nonmetals. These diversified fields of investigation require the services of physical chemists, organic, analytical, and inorganic chemists, microscopists and specialists in spectroscopy. The Bureau of Mines also acts as a consulting laboratory for other departments of the Government to whom advice is given regarding the selection of economical and efficient fuels and fuel burning equipment for special plants.

One of the recent achievements of the Metallurgical Division, has been the development of an electrolytic method for extracting manganese from its ores. The metal obtained is of 99.85 per cent purity. The process may make possible the exploitation of this country's low-grade deposits. The division has also published results of its researches on the theory of metallic crystals. Fundamental studies of metallurgy by the methods of thermodynamics were not neglected. Investigations were carried out to determine the possibilities of utilizing the native low-grade chromite ores for the production of chromium. The iron and steel section studied, among other things, the relative desulphurizing power of the blast-furnace slags likely to occur at fifteen hundred degrees centigrade. Work was carried out on the use of diethylene triamine for absorbing sulphur dioxide from metallurgical wastes. A valuable system was built up to determine which of the various ore-treatment methods is preferable for a particular kind of metallic or nonmetallic ore.

The experimental work on petroleum and natural gas is centered at the Experiment Station at Bartlesville, Oklahoma, and at the station on the campus of the University of Wyoming. The technology and properties of the different kinds of gasoline sold throughout the country are studied. Recent publications have dealt with methods for determining the "molecular" weights of higher boiling fractions, and a method for the manufacture of paraffin wax from petroleum. This division is also responsible for the operation of the great helium plant near Amarillo, Texas. The plant provides the entire supply of helium gas used in Army and Navy dirigibles. It supplied the helium used in the recent stratosphere flight made under the auspices of the National Geographic Society and the Army Air Corps. The gas promises to be of real value in medicine. The United States Public Health Service is experimenting on the use of helium mixed with oxygen in the treatment of asthma and other respiratory ailments.

The Experiment Stations Division of the Bureau of Mines controls the research laboratories located at Pittsburgh, Pennsylvania; Minneapolis, Minnesota; Tuscaloosa, Alabama; Rolla, Missouri; Bartlesville, Oklahoma; Reno, Nevada; Salt Lake City, Utah; Tucson, Arizona; Berkeley, California; Seattle, Washington, and College Park, Maryland. The laboratories of the Experiment Station Division are located near universities and this circumstance permits close coöperation in research among the members of the scientific staffs. For example, the laboratory at College Park is on the grounds of the University of Maryland; the one at Bartlesville is associated with the University of Oklahoma; the one at Seattle is close to the University of Washington, and so on. The advantages of such an arrangement have been amply demonstrated. Each station devotes particular attention to the problems of the mineral industries of the adjacent regions. The laboratory at Seattle, for example, has discovered that large deposits of olivine on Cyprus Island in Puget Sound are suitable for manufacturing into refractory brick. The station at Tuscaloosa is making progress on methods of concentrating low-grade nonmetallic ores to yield a commercially acceptable grade of kyanite. This mineral, consisting of silicate of aluminum, is used in the manufacture of refractories.

The Nonmetallic Minerals Experiment Station was located at New Brunswick, New Jersey, until recently when it moved to its new quarters at College Park, Maryland. The Station devotes considerable attention, among other things, to methods of retarding the setting of cement. Steam seasoning has been found to be more efficient in the control of the setting process than is the addition of gypsum. Another discovery of this laboratory is the finding that the "caustic embrittlement" of boiler steel is due to the presence of certain amounts of silica dissolved in the caustic boiler water. The discovery may, in time, effect tremendous savings by pointing the way to a method for the prevention of this serious defect. In connection with its work on nonmetallic minerals, the Seattle experiment station coöperated with the College of Mines of the University of Washington in establishing data regarding the physical and chemical properties of coke. The coke was produced commercially from the various western coals, and the data, which was published, contains the first authentic information on the subject. Some of the laboratories are engaged in the sampling and analysis of gases taken from mines and tunnels, this work being done in connection with the safety investigations of the Bureau. In one year, one thousand and ten samples of gases were thus analyzed. A new micro-colorimetric

method for the determination of benzene vapor in the air was developed, and has recently been applied in the analysis of blood and urine. A new micro-colorimetric method for the determination of toluene in air, in blood, and in urine, was demonstrated. These methods, which find easy practical application, represent a marked improvement in accuracy over those previously used. In connection with dust investigations, a micro-projector arrangement and procedure were developed for determining the particle size distribution and number concentration of dust in the air of mines and tunnels. These achievements are all leading up to the larger problem of studying and gaining more knowledge about the physical effects produced by the exposure of miners to various dusts. The data accumulated will serve as a basis upon which recommendations for improvement can be made. A recent small increase in the allotment of funds to the Bureau will permit it to study more intensively the dust disease hazards of the mining industry.

The largest experiment station of the Bureau of Mines is the one located at Pittsburgh. The city is an important industrial center, and its many research institutions enjoy the services of men of international reputation in the field of industrial technology. The Carnegie Institute of Technology, the University of Pittsburgh, The Westinghouse Electric and Manufacturing Company, and the Mellon Institute of Industrial Research are all located in Pittsburgh. The chemists at the experiment station may receive university credit for research work conducted in the Government laboratories. They have the stimulation of working with men who are recognized authorities in their particular fields, and they may attend the seminars which are held for the purpose of elucidating theoretical matters and broadening one's scientific outlook. The investigations of the Pittsburgh Experiment Station concern industrial products like iron, steel, coal, coke, gaseous fuels, tar and oils, explosives, mine atmospheres, etc.

The publications of the Bureau of Mines appear in several series. The scientific and technical researches are presented in the Bulletins and Technical Papers. For example, bulletin number 369 is a contribution of the Pittsburgh Experiment Station, and deals with explosion tests of Pittsburgh coal dust in the experimental mine. Technical paper 560 contains the results of studies on the corrosion of steel by gases containing traces of hydrogen sulphide. There is another series entitled, Reports of Investigations. These are short papers which present the principal features and results of minor investigations, or of

special phases of major investigations. Report of Investigation number 3250, for example, describes a thermal conductivity apparatus for the continuous determination of the helium content of natural gas. Another publication of direct interest to chemists is the *Minerals Yearbook*. This annual contribution of the Bureau contains chapters on the production and consumption of metals and nonmetallic minerals. Other series of publications are the *Economic Papers*, which are analytical studies of commercial data regarding mineral commodities; *Handbooks*, which treat of matters relating to safety or efficiency; and *Miners' Circulars* which are written in popular style and are of general interest to the men actually engaged in mining. There is a publication which contains a list of all the contributions of the Bureau from the time of its establishment in 1910, up to the year 1932. Supplementary lists for each of the years since 1932 have been printed. All of these lists of publications may be consulted in the larger technical and university libraries.

The total monetary appropriations to the Bureau of Mines, with which it carried out all of its multitudinous activities for the fiscal year 1936 amounted to $2,116,101. This sum represents about two hundredths of one per cent of total Governmental expenditures for that year. What beneficial returns have accrued to the people of the United States as a result of this investment? The vast mineral resources of the nation have been studied with a view to their more complete and more economical utilization. New uses for minerals and mineral products have been discovered. More efficient methods of production in the petroleum industries have been developed. New industries resulting from the researches of the Bureau have been started. And finally, the health and safety work of the Bureau has saved many lives, prevented many accidents, and has tended to dispel from mining communities the haunting dread of an impending disaster. There is, however, much work which cannot be undertaken by the Bureau of Mines because of its limited personnel. An increase in the funds available will enable it to solve more problems, and to return to the nation the greater dividends resulting from its larger work. The problems exist; good men are available; funds are lacking.

At the present time, the Bureau of Mines employs two principal chemists, six senior chemists, ten chemists, ten associate chemists, twenty assistant chemists, and eighteen junior chemists; making a total of sixty-six. In addition there are many employees doing work of a sub-professional nature, who are rated accordingly.

# The Chemist Advisory Council, Inc.

*By* **M. R. Bhagwat, F.A.I.C.**

THE following is a summary of the Secretary's Report presented at the Annual Meeting of the Members of Chemist Advisory Council, Inc., held on January 20, 1939, covering the essential points of the Council's activities during the year 1938.

### Sponsoring and Coöperating Organizations

American Institute of Chemical Engineers.
American Institute of Chemists.
Association of Consulting Chemists and Chemical Engineers.
The Electrochemical Society.
The American Chemical Society expressed their sympathy with the objectives of the Council as stated in the charter.

Committees have been and are being appointed by the local sections of the American Chemical Society. All Chapters of THE AMERICAN INSTITUTE OF CHEMISTS have standing committees.

### Procedure of Registering and Assisting the Registrants

The Council is the only agency in existence working solely in the interest of the chemist who is unemployed or unsatisfactorily placed. No charge is made for this service. Complete records are obtained and classified. Registrants are given information about chemical industries and advice as to how to apply for work. The spirit of guidance, sympathy and encouragement maintains the morale of registrants and helps them to help themselves in finding work.

During the calendar year 1938, 690 individuals (40 per cent outside the New York area) registered. All have at least one degree in chemistry; about 10 per cent have the Ph.D., and more than half have had considerable industrial experience.

In addition to this qualified group, more than two hundred inquiries were received from persons having insufficient education or experience to register with the Council.

Specifications for 138 vacancies were received and 87 registrants reported that they had secured permanent employment. Due to limited funds, no canvass was made of the registration files, hence the actual number now employed among those registered is not known.

### Financial Support

The Council's activities have been supported by voluntary contributions from chemical companies, technical societies and associations, and

employed chemists, and chemical engineers. According to the Treasurer's Report dated January 20, 1939, total receipts were $5,209.72; total expenditures $3,880.46; leaving a bank balance of $1,329.26.

### Other Donations

Office space at 300 Madison Avenue by the Carbide and Carbon Chemical Corporation.

Office equipment by the American Cyanamid Company, Carbide and Carbon Chemical Corporation, and the American Agricultural Chemical Company.

Journals and publications by *Chemical Industries, Chemical & Metallurgical Engineering, Oil, Paint and Drug Reporter, News Edition of Industrial and Engineering Chemistry, The Chemist, The Indicator, The Michigan Architect and Engineer,* and *The New Yorker.*

### Conclusion

With the limited funds available at its disposal, the Council has handled more than a thousand individual cases, carried on vast correspondence, maintained a place for the welfare of chemists and chemical engineers, etc. The expansion and effectiveness of the activities of the Council will depend upon the financial support received from the chemical profession.

CHEMIST ADVISORY COUNCIL, Inc., 300 Madison Ave., N. Y. C.

### Summary of Registration

Total Registration — (January 1, 1938 to December 31, 1938) — 690

GROUP 1 (349)

(a) B.S. degree with two or more years' industrial experience.
(b) M.A. degree with more than one year's industrial experience.
(c) Ph.D. degree with or without experience.

*Residence*: Greater Metropolitan Area — 167 or 48%.
Outside Greater New York — 182 or 52% (32 states represented).
80% of registration from Conn., Ill., Mass., New York, New Jersey, N. Carolina, Ohio, and Penna.
64% of outside registration from Conn., Ill., Mass., North Carolina, Ohio, and Penna.

*Education*: Graduates and post-graduates of 106 institutions represented.
194 have B.S., Ch.E., etc. from 88 colleges.
62 have M.S. from 35 colleges.
67 have Ph.D. from 27 colleges.
26 have foreign degrees.

*Age*: 42% are below 30 years of age.
36% are between 30-40.
15% are between 41-50.
7% are over 50.

*Industrial Experience*: 44% have less than 5 years' industrial experience.
20% have between 6-10 years' experience.
24% have between 11-20 years' experience.
12% have over 20 years' experience.
There are 15 women in this group.

GROUP 2 (323)

(a) B.S. degree but less than two years' industrial experience.
(b) M.A. degree but less than one year's industrial experience.

*Residence*: Greater Metropolitan Area — 222 or 68%.
Outside Greater New York — 101 or 32%.
43% of outside registration from Mass., N. Y. State, and Penna. (35 states represented).

*Education*: Graduates and post-graduates of 103 institutions represented.
283 have B.S., Ch.E., etc. from 98 colleges.
39 have M.S. from 23 colleges.
1 has a foreign degree.

*Age*: 73% are less than 25 years old.

*Industrial Experience*: 63% have had no industrial experience whatever.
There are 35 women in this group

GROUP 3 (18)

Non-graduates with more than five years' industrial experience.
All have had some college training and most of this group have had more than ten years' experience.

## Illinois Chapter of the Institute Organized

**The members of THE AMERICAN INSTITUTE OF CHEMISTS in Illinois met on January 13, 1939, at a dinner in the Stevens Hotel, Chicago, to organize an Illinois Chapter. Gustav Egloff presided. Robert J. Moore, President of the INSTITUTE, spoke on the aims and activities of the organization. D. B. Keyes, F.A.I.C., discussed "The Chemist and His Profession", and Foster D. Snell, F.A.I.C., spoke on the need of licensing.**

**An organizing committee was appointed to consist of Gustav Egloff, F.A.I.C., and Benjamin R. Harris, F.A.I.C.**

# COUNCIL

## OFFICERS

*President*, Robert J. Moore
*Vice-President*, J. W. E. Harrisson
*Secretary*, Howard S. Neiman
*Treasurer*, Burke H. Knight

## COUNCILORS

Ross A. Baker
Frank G. Breyer
M. L. Crossley
Gustav Egloff
Harry L. Fisher
Neil E. Gordon
W. T. Read
Norman A. Shepard
Maximilian Toch
Lloyd Van Doren
Gerald Wendt

## CHAPTER REPRESENTATIVES

| *New York* | *Niagara* | *Philadelphia* | *Washington* |
|---|---|---|---|
| W. D. Turner | A. W. Burwell | Gilbert E. Seil | Henry G. Knight |

### January Meeting

The one hundred and fifty-eighth meeting of the Council of The American Institute of Chemists was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on January 10, 1939, at six o'clock p. m.

Vice president Joseph W. E. Harrisson presided. The following officers and Councilors were present: Messrs. R. A. Baker, F. G. Breyer, J. W. E. Harrisson, B. H. Knight, H. S. Neiman, W. T. Read, G. E. Seil, M. Toch, W. D. Turner and L. Van Doren. Messrs. M. R. Bhagwat, John Hubbell, W. W. Winship, and Miss V. F. Kimball were present.

Dr. Harrisson reported for the Committee on Licensing.

A proposed Bill to license chemists in the State of New York was submitted by the Licensing Committee, and after careful consideration by the Council, and upon motion made and seconded, this proposed Bill was approved, and the Committee was instructed to continue its efforts to have this Bill introduced into the State Legislature.

The Treasurer's report, showing a bank balance as of January 10, 1939, of $3546.32, with liabilities of $446.74, was read and accepted.

The Secretary read a report from Gustav Egloff regarding his representation of The American Institute of Chemists at a meeting of the Illinois Engineering Council.

The Secretary reported that President Robert J. Moore would speak at a meeting of The American Institute of Chemists' members in Chicago on Friday, January 13th, with the aim of forming an Illinois Chapter. Dr. D. B. Keyes is also scheduled to speak at that meeting on the subject of "The Chemist and His Profession".

A copy of an employment contract for chemists was read and the Secretary was instructed to present it at the February meeting of the Council.

The following new members were elected:

FELLOWS

**Anderson, Winslow S.**
(1939), *Dean*, Rollins College, Winter Park, Florida.

**Beaver, David J.**
(1939), *Assistant Director of Research*, Monsanto Chemical Company, Nitro, West Virginia.

**Brown, E. K.**
(1939), *Chief Chemist*, Standard Oil Company, Rocky Mountain Division, Manufacturing Department, Casper, Wyoming.

**Cliff, Ivan S.**
(1939), *Research Chemist*, Shell Petroleum Corporation, Houston, Tex.

**Desha, Lucius J.**
(1939), *Professor*, Washington and Lee University, Lexington, Virginia.

**Koten, Irvin A.**
(1939), 504 Graham Street, Sturgeon Bay, Wisconsin.

**Maynard, Edward W.**
(1939), *Vice-president*, Atlas Powder Company, Wilmington, Delaware.

**Nollau, Edgar H.**
(1939), *Staff Associate*, E. I. duPont de Nemours and Company, Wilmington, Delaware.

**Parker, Ivy M.**
(1939), *Research Chemist*, Shell Petroleum Refinery, Houston, Texas.

**Ralston, Anderson W.**
(1939), *Chief Research Chemist*, Armour and Company, Chicago, Ill.

**Ransom, James H.**
(1939), *Head of Department of Chemistry*, The James Milliken University, Decatur, Illinois.

**Smith, J. Frank**
(1939), *Associate Professor*, University of Southern California, Los Angeles, California.

**Weaver, Willis K.**
(1939), *Chief Chemist*, Baxter Laboratories, Inc., College Point, N. Y.

A letter from the Washington Chapter was read and Dr. Read was instructed to reply to it.

A letter from The Chemist Advisory Council, Inc., was read, thanking THE AMERRICAN INSTITUTE OF CHEMISTS for its contribution of $100.00 to the work of this Council.

A committee subject to appointment by President Moore was instructed to prepare plans for the Annual Meeting of the INSTITUTE to be held in New York, N. Y.

Upon motion made and seconded, Alexander J. Stirton was raised from Associate to Fellow.

Upon motion made and seconded, the amount of $50.00 was appropriated for the use of the Committee on Licensing.

Mr. Bhagwat and Mr. Breyer reported for the Chemist Advisory Council.

There being no further business, adjournment was taken.

Ross A. Baker, F.A.I.C., and James T. Grady were awarded Fellowships by the American Institute of the City of New York, at a dinner in the Hotel Pierre, New York, N. Y., on February second. The gold medal of the American Institute was awarded to the Sperry Gyroscope Company.

Sir Gilbert T. Morgan, F.R.S., who retired from the directorship of the Chemical Research Laboratory at Teddington in September, is now chairman of the Research Fund Committee of the Institute of Brewing, reports the *Chemical Trade Journal and Chemical Engineer, (London)*.

# CHAPTERS

## New York

*Chairman*, Frederick Kenney *Vice-chairman*, Frederick W. Zerban

*Secretary-treasurer*, D. H. Jackson
17 John Street
New York, N. Y.

*Council Representative*, W. D. Turner

A meeting of the New York Chapter was held at The Chemist's Club, New York, N. Y., on January 13, 1939. Mr. Frederick Kenney, chairman, presided at a symposium on "Can We Expand Public Research for Industry?" with Dr. J. F. X. Harold as the first speaker, followed by Mr. Frank G. Breyer, and by comments and questions from the audience.

Dr. Harold clarified the subject by stating that through the expansion of public research we may provide means of employment for chemists now out of positions. This is an emergency question, and one which is sometimes ignored by those who are contented with their own positions and who forget the plight of no less worthy men in need of a means of livelihood. There are also misinformed men who think unemployment is not a serious condition. There will be differences of opinion, of course, in the discussion of the topic, but no matter what these differences are, we may see some light which will help us to ameliorate the present conditions of chemists and to employ greater numbers of them. This solution of the problem demands the force and push of the chemical profession behind it. It will offer chemists employed through it a living wage.

Briefly, the plan is to assign work projects of thesis type to the unemployed chemist and return him to the university laboratory to do work on government pay. The work might be assigned by the technological associations, trade and manufacturers' associations, or other agencies. The research would be open, or public, research, and should at the instant of its completion be dedicated to the world at large and particularly to the country in which the chemist lives.

By this plan, the chemist will be stimulated and the professor made more practically minded. The academic character of the university staff will be lessened as it is brought into contact with actual work problems. These problems, of course, will be considered from every angle to determine whether they are practical.

The plan will remove from the public the burden of indiscriminate public aid. The chemist thus employed will not feel that he is accepting relief but that he has honorable employment in working on problems of practical worth and technological interest. The public nature of the work will receive the cooperation of the press, influencing the public to become more scientific minded.

Much of the literature appearing in the journals at present is exceedingly technical and only of interest to those

in the immediate field. Practical research is too often locked away in the desks of directors of industry.

This project is timely because of the present governmental tendency to regard patents as a monopoly. Our progress in the profession may be just the result of this opportunity and of seeing it. There will be some difficulties. Corporate research may regard public research as inimical, but the better class of corporations will come to see its advantages in time. Industry will profit by it. Manufacturers may support it because of its stimulating value. Trade unions, perhaps, should be consulted, also, as to a choice of project. Perhaps the selection of a suitable works project could be made by a small group taken from trade associations, manufacturers' associations, technological associations, trade unions, and representatives of the technical press. For example, the subject of stream pollution offers a project of great possibilities. If some fear that the subsistence wage will make the chemist indolent, certainly that is better than leaving him entirely unemployed. There may even be objections from the professors who act as hosts, but they will be won by the subjects assigned. It would be a good thing, if the universities and professors could become practical. Some of our universities turn out students without telling them what their chances are of getting employment. We may also have to contend with the acutely professional attitude. The worst attitude of all is that of those who say "These men are unemployable." The survival of the fittest does not mean the survival of the most fit. The man who can sleep in the doorway may live longer than the university professor because he can stand the strain longer, not because he is intellectually the better man.

Mr. Frank G. Breyer emphasized the facts which now exist in relation to unemployment among chemists. Colleges and universities are graduating each year a great surplus of chemists over the current demand. The surplus of chemists for the past seven years has exceeded the employment of chemists. The older men in the profession too often find themselves unwanted. The success of research projects by certain professional societies offers encouragement to Dr. Harold's project. After considering statistics showing the salary ranges for chemists from 1916 to 1930, and the employment situation as indicated by the registration at the Chemist Advisory Council, Mr. Breyer called upon chemists to do something about the situation, and advocated the approval and carrying out of the proposed expansion of public research to employ chemists now out of positions.

After comment and discussion by the audience, Mr. Breyer then moved that the chairman appoint a committee to report in writing to the National Council of THE AMERICAN INSTITUTE OF CHEMISTS that the New York Chapter is in favor of increasing the government employment of chemists under the direction of competent groups in the profession itself, analogous to the employment of chemists by technical societies such as the American Association of Textile Chemists and Colorists and the Federation of Paint and Varnish Superintendents' Clubs. This is employment in public research.

The motion was passed and a committee, consisting of Dr. Harold, Mr. Breyer, and Dr. Kirk, was appointed.

Maximilian Toch, F.A.I.C., left recently on a trip to the Panama Canal Zone.

## Niagara

*Chairman,* William R. Sheridan *Vice-chairman,* Maurice C. Taylor

*Secretary-treasurer,* Carl H. Rasch
1212 Oliver Street
North Tonawanda, N. Y.

*News Reporter to* THE CHEMIST, George W. Fiero

*Council Representative,* Arthur W. Burwell

The December meeting of the Niagara Chapter of THE AMERICAN INSTITUTE OF CHEMISTS was held at the Red Coach Inn, Niagara Falls, New York, on December 2, 1938. The subject for discussion was, "The Chemical Industry Along the Niagara Frontier". The discussion covered the history and field of activity of chemical and related industries, their products and how they fit into the general picture, especially with reference to the part chemists take in these activities. The variety of chemicals and chemical products together with the natural resources available in this section will continue to influence the industrial growth of the Niagara Frontier.

## Washington

*President,* Frank O. Lundstrom

*Vice-president,* Albin W. Warth *Treasurer,* Joseph J. Stubbs

*Secretary,* A. P. Bradshaw
2121 New York Avenue, Washington, D. C.

*News Reporter to* THE CHEMIST, G. P. Walton

*Council Representative,* Henry G. Knight

*Executive Committee*

| | | | |
|---|---|---|---|
| M. S. Anderson | J. H. Hibben | R. M. Mehurin | E. F. Synder |
| P. R. Dawson | L. N. Markwood | A. R. Merz | E. K. Ventre |
| R. B. Deemer | N. W. Matthews | H. P. Newton | C. W. Whittaker |
| H. C. Fuller | J. W. McBurney | W. M. Noble | J. F. Williams |
| L. R. Heiss | A. L. Mehring | W. H. Ross | P. A. Wright |

A meeting of the recently appointed Executive Committee was held in the Board Room of the Cosmos Club December 6, 1938. The following officers and members were present: A. P. Bradshaw, R. B. Deemer, H. C. Fuller, L. R. Heiss, F. O. Lundstrom, L. N. Markwood, N. W. Matthews, A. L. Mehring, M. Noble, W. H. Ross, J. J. Stubbs, E. K. Ventre, and P. A. Wright.

The first and chief business comprised a round table discussion of the question: "How can we improve the attendance at the evening meetings, in comparison with the luncheon attendance?"

The following points were made:

1. In some cases, attendance at luncheons is used as the excuse for non-attendance at business meetings

and especially when both meetings are held during the same month. The opinion prevailed, however, that the advantages of the luncheons more than compensate for the few who stay away from the business meetings for this reason. The luncheons bring good publicity to the INSTITUTE through the many guests who have attended and enjoyed them. In many cases these guests have become enthusiastic members of the INSTITUTE. Also the luncheons can not be substituted for the regular evening meetings because of the short time available for discussion of business, and because the attendance is limited to those who work near where the luncheon is held.

2. The lack of good objectives to hold the interest of the members was offered as another reason for non-attendance at business meetings. An Objectives Committee is needed to plan and present to the Chapter a set of working projects.

It was also suggested that a committee be appointed to study legislation pertaining to the chemical profession and if necessary to call to the attention of the Council any unfavorable legislation which might be avoided by timely intervention.

It was brought out that outside agencies use the Government salaries as a basis for their own pay rolls. It is essential to the welfare of the chemist, therefore, that the correct ratings be given to chemists in this service. It is well known that there are chemists doing work in the lower grades worthy of a much higher grade and salary. It was suggested that the INSTITUTE attempt to correct these injustices. There is no active professional organization within the Government interested in the chemist specifically.

3. Criticism was offered, that there has been too much dwelling on the past (reminiscencing) and not enough actual progress.

4. Because of the increasingly great number of organizations in Washington it has become necessary to make the meetings interesting and attractive to obtain maximum attendance. It was suggested that a Program Committee be appointed to work toward this end. A tentative subject program for four evening meetings was presented: (1) A subject of general chemical interest; (2) One on trends in chemical education; (3) One pertaining to the economics of chemistry; and (4) A contact with the National organization (possibly through one of the National Officers).

The President was requested to appoint a committee to look up the History of the Local Chapter and to obtain a complete file of THE CHEMIST.

The President was requested to appoint a committee to survey the National Constitution and to revise the constitution of the local chapter to conform therewith.

The suggested changes in the By-Laws of the National Organization, made by the Niagara Chapter, were discussed, and a movement was started to have the Secretary voice the approval of the Washington, D. C., Chapter concerning these changes, especially their recommendation concerning an alternate to attend the Council meetings.

The Secretary was requested to write General Secretary Neiman to the effect that the Washington Chapter is in favor of having the Annual Meeting of the INSTITUTE held in New York, at the World's Fair, in accordance with the letter from Mr. Wendt to Mr. Neiman, November 7, 1938.

## Pennsylvania

*Chairman*, George Russell Bancroft *Vice-Chairman*, Walter L. Obold
*Secretary-treasurer*, Harry C. Winter
The Biochemical Research Foundation
133 South 36th Street
Philadelphia, Penna.
*Council Representative*, Gilbert E. Seil

# THE SCIENCE ANGLER

**Kenneth E. Shull, J.A.I.C.**

Within recent years there has been much noise made about noise. Medical journals have teemed with warnings of the deleterious effects of noise on the human system; laboratories have reported the boiling of eggs, the souring of milk, the destruction of bacteria, and the production of "cold light" through the medium of supersonic vibrations (high frequency sound vibrations); and magistrates have banned the too-vigorous "honking" of horns.

By means of a sensitive instrument, the acoustimeter, the intensity of various sounds has been recorded and expressed as so many "decibels". One of the loudest noises measured is that of an air-plane engine (about 125 decibels). Thunder averages about 95 decibels, and a vacuum cleaner 70. Perhaps the faintest of ordinary noises is the rustling of leaves in an otherwise quiet forest (17 decibels).

Better butter can now be made as the result of a discovery that citric acid reduces the loss of fat in buttermilk, and improves the flavor and aroma.

In view of this, it might not be too far fetched to suggest that our bovine friends be given a daily glass of orange juice.

According to an old Greek saying, "Water is the best of all things". In most parts of the world aqua is present in such quantities that nearly all may imbibe of its goodness; yet there are certain arid regions where, because of its scarcity, it is a luxury—a priceless possession.

In these dry parts, unusual methods are being used to obtain water from the air. One of these, developed by French scientists, utilizes a difference in temperature to condense moisture on roughened walls. In another, wood chips are caused to absorb moisture by being exposed to damp night air. They are then placed in pipes which terminate in a cool chamber. Heat from the sun liberates the absorbed water which is ultimately condensed.

The scientist is constantly endeavoring to fathom the secrets of nature and to improve upon her handiwork. Synthetic cottons (rayon, etc.) are slowly but surely displacing the natural product. And during the past few years there have appeared on the market numerous varieties of fibrous glass, any one of which may some day become King of the Textiles.

Glass fiber has a diameter of 0.00025

in. as compared to 0.00045 in. for rayon; 0.0007 in. for silk; 0.00075 in. for cotton, and 0.0009 in. for linen and jute. In tensile strength it compares favorably with steel.

Who knows? Glass dresses may some day be in the lime light.

The oft-heard statement, "don't believe in signs", might well be extended to include "and don't believe in names". The American nickel actually contains about three times as much copper as it does nickel.

The story is told that many years ago members of the Bureau of Standards Staff took turns in conducting visitors through the laboratories. On one such occasion a layman of intellectual curiosity questioned the guide as to the use of liquid air (at that time no practical application had been found for liquid air). The guide replied that it is used to lubricate the square root of minus one.

Although not of scientific accuracy, this answer, to our way of thinking, is the best that could have been given under the circumstances. It illustrates certain attributes of every true scientist —clear thinking and presence of mind.

# NORTHERN LIGHTS

***By* Howard W. Post, F.A.I.C.**

The new president of the Canadian Institute of Chemistry, Dr. Otto Maass of McGill University, gives us much food for thought in his recent article entitled "The C.I.C. is Coming of Age" in *Canadian Chemistry and Process Industries* **22** 554 (1938). He pays his compliments to his predecessors in words to the effect that the Institute "has unified professional Chemistry in this Dominion from coast to coast". That is indeed something, but his remarks about the future are even more interesting. Dr. Maass raises the question as to what affairs will occupy the attention of the chemists of the future. That is, will chemists in the next generation be more interested in economics, social welfare, government, etc., than now? One of his points is that the generation to come will regard as indispensable "cultural" knowledge information now considered so technical and "high-brow" as to be the exclusive property of specialists. The question then includes not only the intrusion of non-chemical knowledge into the life of the chemist but also the intrusion of chemical and physical knowledge into the consciousness of the body politic. Dr. Maass even visions a time when "perhaps every second person" will be the possessor of knowledge and of qualifications which would admit him to membership in the Institute as it is constituted today.

We might hazard an opinion that such a day is far, far in the dim distant future and furthermore that we shall not shed any tears therefor. The thought of our citizenry, with knowledge of things scientific, in the flush of rapid intellectual growth, forbearing to exercise majority rule in the regulation of chemical industry is somewhat beyond the range of probability, in our opinion.

We understand that a new material called "Velan" has been put on the market by Canadian Industries, Ltd., and given a rather spectacular work-out just this last summer. "Velan" treatment renders fabrics permanently resistant alike to staining, spotting, and the adsorption of water and, in the language of its sponsors, "increases their softness and draping qualities". The work-out occurred at the Canadian National Exhibition of 1938. The eighteen foot Union Jack which flew at the top of the tallest pole on the grounds remained at its staff continuously for fourteen days and nights and was as fresh and in as good condition at the end of that period as when first raised. In other years the big flag had to be replaced three or four times during that length of time. The answer, "Velan" — the flag had been treated before use.

# EMPLOYMENT

## Chemists Available

CHEMISTRY PROFESSOR, F.A.I.C. Ph.D. from leading Eastern University, seeks permanent teaching position in a university or college, preferably with opportunity for research. Major field organic; has also taught inorganic and analytical; independent research. Eleven years teaching, four years industrial experience; now teaching. Location immaterial. Please reply to Box 25, THE CHEMIST.

CHEMICAL ENGINEER, F.A.I.C., Age 33. Wants to organize and operate a trouble-shooting and operations development department in a medium-sized manufacturing plant. Varied experience with Bureau of Standards, Du Pont, and others qualified me for this work in many fields. Please reply to Box 111, THE CHEMIST.

INDUSTRIAL CHEMIST, F.A.I.C., Harvard Graduate; age 36. Ten years' plant and laboratory experience. Pulp, paper, paper board mills; cellulose plastics; mineral pigments; dyes; starches, resins and waxes. Available immediately. Please reply to Box 103, THE CHEMIST.

CHEMIST-BACTERIOLOGIST, A. A. I. C. Analytical, research development. Pulp, paper and by-products; distilled alcoholic beverages; dairy products; brewery; soap, pharmaceuticals, and cosmetics; general food investigations. Please reply to Box 101, THE CHEMIST.

HUNGARIAN CHEMIST, 26. Ph.D. Edinburgh, Scotland. Diplom Ingenieur Chemiker, Technische Hochschule, Zurich, Switzerland. Fluent English, German, good French, Italian, Spanish. Reads Swedish, Norwegian. Two and one-half years with pharmaceutical firm of world repute. Medicaments, hormones, vitamins. Abstractor *British Chemical and Physical Abstracts*. Teaching. Organizing experience. Seeks post as research or works chemist, abstractor or translator. Salary by agreement. Please reply to Box 21, THE CHEMIST.

YOUNG WOMAN, College. Chemistry, business, and secretarial. Invaluable assistant to chemical executive. Routine laboratory, stenographic and reference work. New York area. Please reply to Box 23, THE CHEMIST.

BIOCHEMIST, PH.D., M.D., F.A.I.C. American citizen. 20 years' research experience (Germany, U. S. A., South America). Affiliated with South American leading society. Valuable connections in South American government circles. Languages. Thorough knowledge of South American markets and expansion possibilities of United States interests. Country most familiar with: Chile. (Argentina.) Seeks position with American firm here or in South American country. Please reply to Box 121, THE CHEMIST.

## Positions Offered

CYANIDE MILL SUPERINTENDENT for South America. Thoroughly experienced. Speak Spanish. $4200.00.

SOAP CHEMIST. Able to handle production and research on toilet soaps.

PHARMACIST, experienced in bulk production.

PH.D. Broad experience in organic field, especially in dyes and pigments.

PH.D. Recent graduate in physical and organic fields.

M.D. Under 40. Experienced in detail of ethical products. Take over department. Develop into medical director for pharmaceutical manufacturer.

For the above positions, please write to Box 22, THE CHEMIST.

## American-Scandinavian Fellowships

The American Scandinavian Foundation will award ten or more Fellowships of $1,000 each for graduate study for one year in Sweden, Denmark, or Norway. Research subjects include among others, biology, botany, cellulose, chemistry, mathematics, medicine, metallurgy, physics, and physiology. Candidates must be born in the United States or its possessions. They must be capable of original research and independent study, and must submit a definite plan of study. They should be college graduates familiar with one language in addition to English—preferably Swedish, Danish, or Norwegian. Application papers should be filed before March fifteenth. Further information and application papers may be obtained from the Director of Students, The American-Scandinavian Foundation, 116 East 64th Street, New York, N. Y.

James Kendall, honorary member of THE AMERICAN INSTITUTE OF CHEMISTS, and professor at the University of Edinburgh, Scotland, delivered the Royal Institution's Christmas Lectures given in London to young people. The general plan of the lectures was to demonstrate how many of the major discoveries in chemistry were discoveries due to youthful genius, made by young men or women in their teens or twenties. The early life and struggles of a number of brilliant young chemists were outlined.

Foster Dee Snell, F.A.I.C., addressed the Alumni Chemical Society of Brooklyn College on January 25, 1939, on the subject "Opportunities in Industry for Chemistry Graduates".

# BOOKS

U. O. P. Laboratory Test Methods for Petroleum and Its Products. *Universal Oil Products Co.*, 310 South Michigan Avenue, Chicago, 1937. iii + 250 pp. 15.1 × 22.8 cm. $3.00.

The *U. O. P. Laboratory Test Methods* is designed to meet a need which has been created by technical progress in the refining industry. A number of methods have been developed and reported in the literature which have not been standardized by the American Society for Testing Materials. Many of these have been used over a period of years in the Universal Oil Products Laboratories and have, consequently, been thoroughly tested. Each procedure given in the U. O. P. manual "has been found to be operable and to constitute good laboratory practice".

"The use of this book assumes the possession of a copy of the latest edition of the standards and tentative standards of A. S. T. M. Committee D-2—Petroleum and Petroleum Products. The use of chemically pure reagents, an analytical balance, and the accepted quantitative analysis precautions and technique are also assumed."

The book is divided into twelve sections which are devoted to the topics: Analytical procedures, asphalt and road oil, coal and shale and lignite, coke, crude oil, fuel oil, gas, gasoline, inhibitor, kerosene and diesel oil, lubricating oils, and solvents. Twenty-one methods of analysis are included under analytical procedures, ten under asphalt and road oil, one under coal and shale and lignite, one under coke, eight under crude oil, eight under fuel oil, thirteen under gas, nineteen under gasoline, one under inhibitor, four under kerosene and diesel fuel, four under lubricating oils, and one under solvents.

Each experimental procedure is considered with respect to (a) scope, (b) apparatus, (c) reagents, (d) procedure, (e) precautions, (f) calculations, (g) accuracy, and (h) references. Drawings, graphs, and charts are included where they are pertinent to the understanding of the use of the procedure or the interpretation of the results. Two hundred and thirty-eight pertinent items are listed in the index.

The *U. O. P. Laboratory Test Methods* is a valuable addition to the list of analytical manuals, and will prove its value in laboratories where routine procedures, of the type covered, are frequently employed.

Ed. F. Degering, F.A.I.C.

The U. S. Department of Agriculture recently announced the directors for the four farm research laboratories to be established to search for new and wider industrial outlets and markets for agricultural commodities. They are: Northern Laboratory, Peoria, Illinois, O. E. May, F.A.I.C.; Southern Laboratory, New Orleans, Louisiana, D. F. J. Lynch, F.A.I.C.; Eastern Laboratory, Philadelphia area, P. A. Wells, J.A.I.C., and Western Laboratory, San Francisco Bay area, T. L. Swenson. H. T. Herrick was appointed assistant chief of the Bureau of Chemistry and Soils, to have supervision of the chemical and chemical engineering work in all four laboratories.